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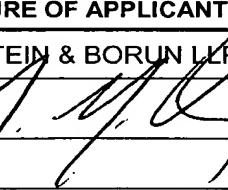
(to be used for all correspondence after initial filing)

		Application Number	09/961,126-Conf. #4200
		Filing Date	September 21, 2001
		First Named Inventor	Stephen R. Schmidt
		Art Unit	1733
		Examiner Name	Gladys Josefina Piazza Corcoran
Total Number of Pages in This Submission		Attorney Docket Number	28748/37575

### ENCLOSURES (Check all that apply)

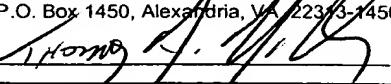
<input checked="" type="checkbox"/> Fee Transmittal Form	<input type="checkbox"/> Drawing(s)	<input type="checkbox"/> After Allowance Communication to TC
<input checked="" type="checkbox"/> Fee Attached	<input type="checkbox"/> Licensing-related Papers	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input type="checkbox"/> Amendment/Reply	<input type="checkbox"/> Petition	<input checked="" type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition to Convert to a Provisional Application	<input type="checkbox"/> Proprietary Information
<input type="checkbox"/> Affidavits/declaration(s)	<input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address	<input type="checkbox"/> Status Letter
<input type="checkbox"/> Extension of Time Request	<input type="checkbox"/> Terminal Disclaimer	<input type="checkbox"/> Other Enclosure(s) (please identify below):
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<input type="checkbox"/> Information Disclosure Statement	<input type="checkbox"/> CD, Number of CD(s) _____	
<input type="checkbox"/> Certified Copy of Priority Document(s)	<input type="checkbox"/> Landscape Table on CD	
<input type="checkbox"/> Reply to Missing Parts/ Incomplete Application	Remarks	
<input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53		

### SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	MARSHALL, GERSTEIN & BORUN LLP		
Signature			
Printed name	Thomas A. Miller		
Date	March 31, 2005	Reg. No.	40,091

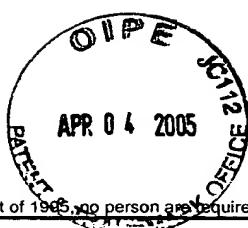
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Dated: March 31, 2005

Signature: 

(Thomas A. Miller)

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## FEE TRANSMITTAL For FY 2005

Applicant claims small entity status. See 37 CFR 1.27

**TOTAL AMOUNT OF PAYMENT** **(\$)** **500.00**

### Complete if Known

Application Number	09/961,126-Conf. #4200
Filing Date	September 21, 2001
First Named Inventor	Stephen R. Schmidt
Examiner Name	Gladys Josefina Piazza Corcoran
Art Unit	1733

Attorney Docket No. **28748/37575**

### METHOD OF PAYMENT (check all that apply)

Check  Credit Card  Money Order  None  Other (please identify): \_\_\_\_\_

Deposit Account Deposit Account Number: **13-2855** Deposit Account Name: **MARSHALL, GERSTEIN & BORUN LLP**

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### FEE CALCULATION

#### 1. BASIC FILING, SEARCH, AND EXAMINATION FEES

<u>Application Type</u>	<u>FILING FEES</u>		<u>SEARCH FEES</u>		<u>EXAMINATION FEES</u>		<u>Fees Paid (\$)</u>
	<u>Fee (\$)</u>	<u>Small Entity Fee (\$)</u>	<u>Fee (\$)</u>	<u>Small Entity Fee (\$)</u>	<u>Fee (\$)</u>	<u>Small Entity Fee (\$)</u>	
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

#### 2. EXCESS CLAIM FEES

##### Fee Description

Each claim over 20 (including Reissues)

Small Entity  
Fee (\$) Fee (\$)

50 25

Each independent claim over 3 (including Reissues)

200 100

Multiple dependent claims

360 180

Total Claims Extra Claims Fee (\$) Fee Paid (\$)

\_\_\_\_\_ - = \_\_\_\_\_ x \_\_\_\_\_ = \_\_\_\_\_

Multiple Dependent Claims  
Fee (\$) Fee Paid (\$)

\_\_\_\_\_

Indep. Claims Extra Claims Fee (\$) Fee Paid (\$)

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#### 3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets Extra Sheets Number of each additional 50 or fraction thereof Fee (\$) Fee Paid (\$)

\_\_\_\_\_ - 100 = \_\_\_\_\_ /50 (round up to a whole number) x \_\_\_\_\_ = \_\_\_\_\_

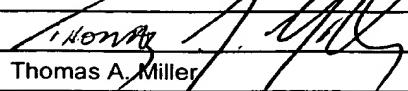
#### 4. OTHER FEE(S)

Non-English Specification, \$130 fee (no small entity discount)

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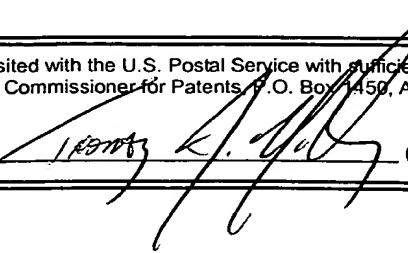
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#### SUBMITTED BY

Signature		Registration No. (Attorney/Agent)	40,091	Telephone	(312) 474-6300
Name (Print/Type)	Thomas A. Miller			Date	March 31, 2005

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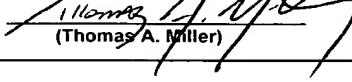
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Dated: March 31, 2005

Signature: 

(Thomas A. Miller)

Docket No.: 28748/37575  
(PATENT)

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:  
Stephen R. Schmidt

Application No.: 09/961,126

Confirmation No.: 4200

Filed: September 21, 2001

Art Unit: 1733

For: APPARATUS AND METHOD FOR  
MANUFACTURING CORRUGATED  
BOARDS

Examiner: Gladys Josefina Piazza  
Corcoran

### APPEAL BRIEF

MS Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

As required under 37 C.F.R. § 41.37(a), this brief is filed within two months of the Notice of Appeal filed in this case on February 2, 2005, and is in furtherance of said Notice of Appeal.

The fees required under 37 C.F.R. § 41.20(b)(2) are addressed in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief contains items under the following headings as required by 37 C.F.R. § 41.37 and M.P.E.P. § 1206:

- I. Real Party In Interest
- II. Related Appeals, Interferences, and Judicial Proceedings
- III. Status of Claims
- IV. Status of Amendments
- V. Summary of Claimed Subject Matter
- VI. Grounds of Rejection to be Reviewed on Appeal

VII.	Grouping of Claims
VIII.	Arguments
IX.	Claims Appendix
X.	Evidence Appendix
XI.	Related Proceedings Appendix

#### 1. REAL PARTY IN INTEREST

The real party of interest in the application on appeal is Copar Corporation. An assignment assigning rights in the present application to Copar Corporation was recorded in the United States Patent and Trademark Office at reel 12424, frame 0323.

#### 2. RELATED APPEALS, INTERFERENCES, AND JUDICIAL PROCEEDINGS

There are no related appeals, interferences or judicial proceedings known to appellant, appellant's legal representatives, or assignee, which will directly affect or be directly affected by, or have a bearing on the Board's decision in the pending appeal. However, appellants take this opportunity to inform the Board that the corresponding patent application filed with the European Patent Office, European Patent Application No. 02292033.4, has recently been granted but for redrafting of the claims into European format. Copies of the European Patent Application, search report and formalities office action are attached as Appendix C pursuant to the provisions of 37 CFR 41.37(c)(1)(x).

#### 3. STATUS OF CLAIMS

Currently, claims 10, 11, 16, 17, and 35 are pending, with the rejection thereof being hereby appealed. The pending claims are reproduced in Appendix A to this brief pursuant to the provisions of 37 CFR 41.37 (c)(1)(viii).

#### 4. STATUS OF AMENDMENTS

An amendment after final was filed subsequent to the final rejection dated September 3, 2004. That amendment after final was entered by way of an advisory action dated January 18, 2005. All amendments have been reflected in the claims reproduced in Appendix A.

## 5. SUMMARY OF CLAIMED SUBJECT MATTER

The pending application is directed to a substantially improved method of manufacturing corrugated paperboard 150. Such a method and apparatus enables the board to be manufactured with higher quality and with less waste. (Specification, page 3, lines 1-6).

By way of background, corrugated paperboard is typically manufactured by combining at least one layer of corrugated paperboard 130 to at least one layer of unformed paper 140. (Specification, page 1, lines 6-7 and Fig. 1).

If only a single layer of unformed paper is combined with the corrugated layer used, the result is called single face web. If the corrugated paper is sandwiched between two layers of flat paper, it is referred to as a double-faced or single wall. Some machines add additional layers of single face web to manufacture double wall, triple wall, and quad wall. (Specification, page 1, lines 6-7 and Fig. 4).

The paper to be formed (known as the "medium") is pressed between two rotating, precisely formed and meshed "fluted" corrugating rolls 122, 124 and formed into its familiar undulating or sinusoidal shape. (Specification, page 6, lines 1-18 and Fig. 1).

This corrugated layer 130 is then bonded to the unformed paper 140 by means of adhesive applied to the tips 134 of the formed flutes 132. As noted above, to create double-faced board 460 the single face web 150 is then bonded to a second unformed paper layer 450. (Specification, page 7, lines 12-16 and Figs. 2 & 4).

The noted adhesive is a mix of starch (usually corn or wheat, but many other starches will serve as well), borax, caustic soda and water. A variety of other adhesive materials, including polyvinyl acetate and sodium silicate, may be used instead of starch. (Specification, page 1, lines 7-11; page 8, lines 12-15).

After the starch has been applied, the medium 130 and liner 140 are pressed together and heated, causing a bond to form. (Specification, page 1, lines 15-20 and Fig. 1).

This method of making corrugated paperboard has been used world-wide for many years. Of course, all industries seek faster production and more consistent quality. (Specification, page 1, line 6 - page 3, line 6).

First, it should be noted that a more or less fixed amount of heat is needed to set (or cure) a given amount of starch. In order to achieve the increased speeds, higher heat transfer rates are needed to cure the higher number of starch bonds needed at these speeds. Modern corrugating machines tend to have more and/or larger diameter process plates and preheating rolls. The corrugating rolls noted, which are used to form the medium, must also be larger in diameter and have special designs to transfer more heat. While this extra heat transfer from the heated rolls and plates to the starch and the papers is absolutely necessary at high speeds, this same heat can be excessive at lower speeds. (Specification, page 2, lines 3-12; Fig. 1; and Rule 1.132 declaration, filed January 3, 2005, paragraphs 8 and 9 a copy of which is attached as Appendix B pursuant to the provisions of 37 CFR 41.37(c)(1)(ix)).

The trend has been to automate the control of the rate of heat application to reduce the contact between the heated surfaces and the paper as the machine is slowed. Unfortunately, even with the minimum possible contact area, the machine continues to transfer excessive heat to the paper and the starch. (Appendix B, paragraph 11).

The inventor observed that it has been customary for corrugator operators to add additional starch at lower speeds to try to balance this extra heat. It was apparent to the inventor that the same papers could be bonded at a higher speed with less adhesive. Upon consideration it also became apparent that the water fraction in this additional starch quenches the excess heat, making the process more forgiving. (Specification, page 2, lines 3-12).

However, by adding adhesive, the overall cost of the process is increased. More importantly, the quality of the finished product is reduced. It is well known that when the starch cures the liner paper 140 is pulled inward toward the curved flute tips 134. This effect is magnified as more starch is applied. The result of excess starch, then, is a deformed finished corrugated sheet having a defect commonly known as "washboarding". A corrugated sheet with "washboard" resembles the surface of the old-style laundering device.

More specifically, the outside paper layer, which is intended to be flat, has a washboard or buckled shape making high quality printing impossible. Printing on such a surface results in an unacceptable, "barred" appearance wherein the ink is unevenly transferred to the high and the low areas of the washboard. (Appendix B, paragraph 15).

Alternatively, significant additional pressure can be applied to the ink transfer plate to allow the printer to force an acceptable contact with all areas of the "washboard" sheet. However, this excess pressure will cause crushing of the board and a concurrent loss of the important stacking strength of the finished product. (Appendix B, paragraph 15).

In order to avoid these difficulties and thus manufacture board 150 at a lower cost and at higher quality, the appellant has arrived at a clever method and apparatus. Rather than adding additional starch to the flute tips 132 in order to quench the heat, plain water alone is first added to the board before applying the starch. This plain water will serve to quench the heat so that a lesser volume of starch is later needed. In other words, the starch is not used to quench the heat by itself. Rather, the initial application of water alone quenches the heat in conjunction with the starch. Accordingly, a lesser amount of starch is needed. This lesser amount of starch does not result in either the added cost or washboarding and barred printing difficulties associated with the prior art. The result is seen as an improvement to the modern corrugating industry. (Specification, page 3, lines 1-6; page 7, lines 1-3; page 9, lines 5-16; page 10, lines 11-17; Appendix B, paragraphs 16-20).

## 6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issues presented on appeal are:

- 1) Whether claims 10, 11, 16, 17 and 35 satisfy the written description requirement of 35 USC §112, first paragraph.
- 2) Whether claims 10, 11, 16 and 17 are anticipated by Wallick, U.S. Patent No. 5,292,391 or Wallick, U.S. Patent No. 5,332,458.

3.) Whether claim 35 is obvious over Wallick, '391 or '458 in further view of Westphal, U.S. Patent No. 5,607,508 and Miller, U.S. Patent No. 5,609,711.

4) Whether claims 10, 11, 16 and 17 are obvious over Swift, U.S. Patent No. 1,199,508 in further view of Wallick, '391 or Wallick '458.

5) Whether claim 35 is obvious over Swift in view of Wallick '391 or Wallick '458 in further view of Westphal, U.S. Patent No. 5,607,508 and/or Miller, U.S. Patent No. 5,609,711.

## 7. GROUPING OF CLAIMS

For purposes of this appeal, all pending claims, i.e., claims 10, 11, 16, 17 and 35 stand or fall together as a group. Appellant reserves the right, however, to present arguments advancing the patentability of the various dependent claims, or the claims supported by the specification, in further prosecution.

## 8. ARGUMENTS

### 1. *Claims 10, 11, 16, 17 and 35 do satisfy the description requirement of 35 USC §112 first paragraph.*

The issue of whether starch and water form an adhesive is immaterial to the patentability of the pending application. First, the use of starch as an adhesive is a well-known, virtually standard technology in the corrugated box industry. Second, the pending patent application does not affect the current method of starch formulation, starch application, or starch curing. Third, the pending application is designed to augment the starch bonding process and to replace some of the applied starch with water alone.

Notwithstanding the above, in the context of compliance with Section 112, the specific issue in question is whether the specification supports the claim limitation that the water and starch combine to form an adhesive. Appellants maintain that the specification has ample support for such a contention and that moreover, one of ordinary skill in the art will

readily understand that a combination of water and starch is used world-wide to form the adhesive used in corrugated paper.

Nonetheless, appellants point to the following sections of the specification which should remove any doubt that the specification supports the contention that water and starch form an adhesive. First, with respect to the teachings of the specification, the applicants turn the Examiner's attention to such examples as page 1, lines 6-10, wherein it states:

"in particular, a starch slurry is prepared as one of ordinary skill in the art will readily recognize using mainly powdered starch and water."

Page 2, lines 3-12, state, among other things, that:

"if the process is operating at a rate that is too slow, virtually all of the water from the starch slurry is absorbed after the slurry is applied to the flute tips and prior to the slurry becoming an adhesive. Water from the starch slurry is absorbed into the fluting paper after the slurry is applied and before the slurry becomes an adhesive."

Again, Appellant wishes to point out that the more important issue being presented is the patentability of using water prior to and instead of some of the starch that has been used prior to the present invention. This additional water is not used as an adhesive, but rather as a process improvement.

Referring again to the specification for Section 112 support, however, in the detailed description on page 8, line 3, the wetting agent 240 is defined as water while the adhesive supply device 116 is defined as providing an adhesive composition, which in turn is defined further in that paragraph as:

"starch composition which may be a starch slurry produced from maize starch, wheat starch, potato starch, tapioca and other vegetable starch."

Describing the actual process of applying such materials to the web, page 10, states:

"At a step 520, a wetting agent such as water with or without additives is applied to a plurality of crests on the first side of the first web. At a step 530, an adhesive composition such as a starch slurry is (LATER) applied to the (SAME) plurality of crests on the first side of the first web after the wetting agent is applied at step 520. The adhesive composition such as starch slurry is prepared as one of ordinary skill in the art will readily recognize. For example, the starch slurry may be heated to a temperature such that the powdered starch granules burst, gelatinize, and form a glue."

In addition, page 2, lines 10-12 state:

"Accordingly, more starch slurry is required in the process to simply serve as a carrier of water in order to ensure sufficient amount of water remains in the slurry to form the adhesive."

In light of the foregoing, appellants respectfully submit that the subject matter of starch and water combining to form an adhesive is well supported by the original specification and that, thus, the 35 USC § 112 rejection of the Examiner should be reversed.

2. *Claims 10, 11, 16 and 17 are not anticipated by either Wallick, U.S. Patent No. 5,292,391 or Wallick, U.S. Patent No. 5,332,458.*

Appellants respectfully submit that the Wallick references fail to disclose each and every element of the pending claims and that the anticipation rejection based thereon must therefore be reversed.<sup>1</sup>

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<sup>1</sup> "Anticipation under 35 USC §102 requires the disclosure in a single piece of prior art of each and every limitation of a claimed invention." *Rockwell International Corp. v. United States* 47 USPQ2nd 1027 (Fed. Cir. 1998).

Claim 10, from which claims 11, 16 and 17 depend, specifies, *inter alia*, an apparatus for manufacturing a corrugated product comprising a corrugating device, a water supply device applying water to only a plurality of crests on a first side of a first web of medium, and a starch supply device applying starch to only a plurality of crests on the first side of the first web after the water supply device has applied water to only the plurality of crests.

Again, the essence of our claim is that we proposed to add an additional device to add water only to the flute tips prior to the application of the starch mixture. This device would be a new addition to the traditional machine and would be located before the currently used starch applicator device.

The Wallick references fail to disclose such elements<sup>2</sup>. More specifically, as shown in Fig. 1A of Wallick, a resin applicator 44 sprays resin upon a corrugated sheet prior to application of a glue or starch slurry by way of an applicator 42 downstream of the resin applicator 44.

As agreed by the Examiner, the Wallick references fail to disclose a water applicator prior to the starch applicator but in this regard, the Examiner has consistently been arguing that the resin applicator is "capable" of spraying water. However, appellants have argued and now maintain that such a hypothesis with respect to Wallick is not relevant, but rather what is relevant is what Wallick actually discloses. What Wallick actually discloses is a resin applicator which applies resin to the entire corrugated medium and makes no reference to the application of water to the flute tips only by way of applicator 44.

This difference is not surprising in that the entire focus of the Wallick references is the application of resin to the corrugated board to add strength to the resulting board. It in no way is directed to the idea of reducing the overall STARCH USED in the manufacturing process to thus increase the quality and reduce the expense in manufacturing the board. The Wallick patent is directed entirely to the application of resin. It seems to us

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<sup>2</sup> Wallick '398 and Wallick '458 have the same basic disclosure and thus will be referenced herein in the cumulative sense. In fact Wallick '458 included a terminal disclaimer to disclaim the term of the patent subsequent to the expiration of the '391 patent. Most importantly, the disclosure with respect to the relevant structure that issued is entirely the same.

that the opinion that the Examiner believes the applicator 44 is "capable" of applying water is irrelevant. The crucial points are:

1. Application of water only;
2. Application prior to the starch application; and
3. Application to the flute tips only.

Finally, the appellant reiterates that the proposed application of water is ONLY TO THE FLUTE TIPS. In fact, the appellant's company has manufactured a water spraying device used in the corrugated paperboard industry for over twenty years and has never applied for a patent for this concept. A spraying device, by its very nature will apply any material randomly over the entire surface of the material. The essence of the proposed patent is to apply limited water, only as needed, and only to the flute tips.

The anticipation requirement is one of strict identity and either the reference discloses the element in question or does not. Here it does not. Accordingly, appellant respectfully submits that the anticipation rejection should be reversed.

3. *Claim 35 is not obvious over Wallick, U.S. Patent No. 5,292,391 or Wallick, U.S. Patent No. 5,332,458 in further view of Westphal, U.S. Patent No. 5,607,508 and/or Miller, U.S. Patent No. 5,609,711.*

Claim 35, which depends from the above-discussed claim 10, further specifies that the water supply device is provided in the form of a sprayer. The Examiner admits that the Wallick references fail to disclose a sprayer and for this purpose further cites either Westphal or Miller. However, these references also fail to disclose the pertinent elements of the pending claims such that the obviousness rejection must be reversed. First with respect to Westphal, it discloses a spraying apparatus 13 adapted to spray thin metal coatings through a roller onto a sheet 1. For example, it states it is sometimes desirable to spray thin films with gold, silver, and chromium for decorative purposes, or thin films of aluminum and nickel boron for corrosion protection, or thin films of magnesium fluoride, aluminum oxide, or silicon oxide for non-reflective purposes in optical lens. Accordingly, it can be seen that the

Westphal reference is not at all related to corrugated paperboard manufacturing as is the pending application. However, there is no denying that Westphal does disclose a sprayer. Nonetheless, this is unimportant in that appellants certainly are not attempting to patent a sprayer by itself and do not claim that a sprayer could be a precise method of applying water to the flute tips only. The Examiner could have cited any one of dozens of patents over the past century disclosing sprayers. The issue is what is novel and non-obvious, and that is the provision of water in a corrugated paperboard manufacturing apparatus onto the tips of the flutes of the corrugated board prior to the application of a starch slurry onto those same flutes. As Westphal is not at all even related to corrugated paperboard, it clearly fails to disclose these elements and its provision of a sprayer is inmaterial, adding nothing to the obviousness equation.

Similarly, the Examiner cites the Miller reference. Miller is at least related to the manufacturing of corrugated board in that it discloses spray nozzles 80 which deliver an adhesive onto a sheet to be bonded to a corrugated sheet. Again, a spray device will apply a relatively even coating to the full surface in front of the spray head. In fact, it is obvious to someone skilled in the art that a spray of this sort will result in objectionable overspray which will prevent the noted operation without frequent and extensive cleaning. Appellant also again agrees that the provision of a spraying apparatus by itself is not patentable. What is patentable is the aforementioned combination of elements in a corrugated paperboard manufacturing apparatus wherein water is first applied to the corrugated sheet and then an adhesive composition is applied to the flutes of the corrugated board after the water is applied. Miller discloses nothing in this regard. Accordingly, as the provisions of MPEP §2143 require<sup>3</sup>, as do the anticipation laws, the provision of each and every element of a pending claim in the combination of art, and the references clearly fail to disclose a water supply device applying water to only a plurality of crests on the first side of the first web and then a starch supply device applying starch to only the plurality of crests on the first side of

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<sup>3</sup> "To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations." M.P.E.P. §2143.

the first web after the water supply device has applied water to only a plurality of crests, the obviousness rejection must fail.

Even above and beyond the failure of the combined references to disclose each and every element of the pending claims, however, the references entirely fail to even identify the problems inherent with the prior art, much less the solution identified by the pending application. Accordingly, the combined references fail to suggest in combination to arrive at the pending subject matter in the first place, another indication of non-obviousness<sup>4</sup>.

As stated above, the result of the current prior art process is sometimes a product having a washboard texture on a sheet intended to be flat. Not only is this aesthetically unacceptable, but as the finished sheet will often subsequently be printed upon, such washboarding in a sheet which is intended to be flat will cause printing thereon to be ineffective often resulting in a "barred" appearance as identified above.

None of these difficulties are identified in any of the Wallick '391, Wallick '458, Westphal, '508 or Miller '711 references. As these problems are not even identified in any of those references, clearly they cannot suggest the solution afforded by the present application. The present application first applies water to the flutes of the corrugated roll to quench the heat being generated by the increasingly quick manufacturing process and, as that heat is then quenched thereby, a lesser amount of adhesive is later needed and added.

In light of the foregoing, appellants respectfully submit that the obviousness rejection of claim 35 should be reversed. In appellant's opinion, it is clear that it did not make its case clearly enough at the Examiner level that the proposed patent is directed to a change in the corrugating process to reduce the amount of starch applied and, so, to avoid washboarding. Hopefully, we have now done so.

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<sup>4</sup> "For a claim to be invalid for obviousness over a combination of references, there must have been a motivation to combine the prior art references to produce the claimed invention." *Chiuminatta Concrete Concepts, Inc. v. Cardinal Industries, Inc.* 46 USPQ2d 1752 (Fed. Cir. 1998).

4. *Claims 10, 11, 16 and 17 are not obvious over Swift, U.S. Patent No. 1,199,508 in view of Wallick, U.S. Patent No. 5,292,391 or Wallick, U.S. Patent No. 5,332,458.*

The above-rejected claims, as well as the Wallick '391 and Wallick '458 references, have been discussed above. The only new portion of the equation with respect to this argument is the disclosure of the Swift reference. Swift is quite similar to the Wallick references in that it is primarily directed to the manufacturing of corrugated paperboard having a greater resistance to crushing. (See Swift, column 1, lines 25-29). In order to increase the crush resistance of the paperboard, a layer or coating of sodium silicate is sprayed onto the corrugated board prior to its attachment to the liner sheet. Accordingly, while the Examiner is correct in arguing that the adhesive is applied to the rolls of the flutes of the corrugated layer by way of rollers 29 and 30 downstream of the spraying apparatus 6, the spraying apparatus is applying sodium silicate, not water. Moreover, the sodium silicate is being applied to the side of the flutes opposite to the side of the adhesive applied by rollers 30 and 32. Finally, the spray application is an overall coating and is not aimed at precisely adding material to the flute tips alone. Accordingly, Swift adds nothing to the equation beyond that of the Wallick references.

Perhaps more importantly is the argument again that the Swift reference is directed to an entirely different problem than that being solved by the pending application. As stated above, Swift, similar to the Wallick references, is entirely directed to the idea of manufacturing a corrugated board which is more crush resistant. It is not at all related to the idea of lessening the effects of the excess heat and avoiding excess starch application to the corrugated paperboard manufacturing process, nor the effects that heat has on the cost of the board and its resulting quality. This conclusion is not surprising in that Swift is from the year 1916 and was, we understand, the first patent for a corrugating machine ever presented. The date noted is certainly well before the time at which the manufacturing process had reached the speeds obtainable today wherein heat becomes a problem as identified in the pending application. Accordingly, not only do the combined references fail to disclose each and every element of the pending claims, i.e., the provision of a water spraying device which sprays water on the corrugated flutes prior to a starch supply device which applies starch to those same crests after the water supply device has applied water to the crests, it fails to even

suggest the difficulties first identified by the pending application and then solved by the specification and pending claims. Accordingly, this obviousness rejection should be reversed as well.

- 5) *Claim 35 is not obvious over Swift in view of Wallick, U.S. Patent No. 5,292,391 or Wallick, U.S. Patent No. 5,332,458 in further view of Westphal, U.S. Patent No. 5,607,508 and/or Miller, U.S. Patent No. 5,609,711.*

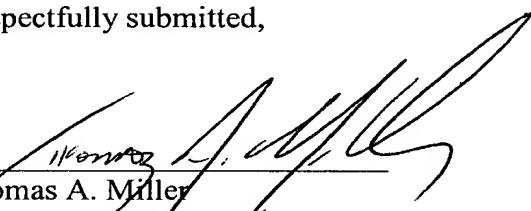
Each of these five references as well as the subject matter of the rejected claims has been discussed above. As the Board will recall, claim 35 is dependent from independent claim 10 and further specifies that the water supply device is provided in the form of a sprayer. However, the Examiner had already identified the Westphal and Miller references as disclosing spraying devices. Further identifying Swift as disclosing a spraying device is redundant. Regardless, for the sake of completeness, appellants again state that they are certainly not attempting to patent sprayers in isolation. The Examiner could have pointed to any one of a number of patents over the years disclosing general spraying technology. What appellants respectfully submit is not been known, and which is not obvious, is the provision of a water spraying device which sprays water onto flutes of a corrugated roll prior to a starch supply device which applies adhesive to those same flutes after the water has been applied. Not only is this structure not disclosed, but again, the difficulties associated with modern manufacturing and the incumbent heat which is generated, are not even identified in any one of the five references now being combined by the Examiner, much less the specific solution afforded by its teachings and now claimed in the subject matter pending before the Board. Accordingly, appellants respectfully submit that the obviousness rejection based on these five references should be reversed as well.

IX. APPENDIX OF CLAIMS INVOLVED IN THE APPEAL

An Appendix A containing a copy of the claims involved in this appeal is attached hereto.

Dated: March 31, 2005

Respectfully submitted,

By   
Thomas A. Miller  
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APPENDIX A

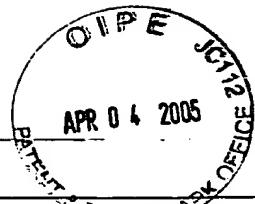
10. An apparatus for manufacturing a corrugated product comprising:  
a corrugating device adapted to form a plurality of flutes on first and second  
sides of a first web of medium, each flute having a crest;  
a water supply device applying water to only a plurality of crests on the first  
side of the first web;  
a starch supply device applying starch to only the plurality of crests on the first  
side of the first web after the water supply device has applied water to only the plurality of  
crests; and  
a securing device adapted to secure a second web of medium to the plurality of  
crests on the first side of the first web to form a single-faced corrugated board, the water and  
starch combining to form an adhesive joining the first and second webs of medium together.

11. The apparatus of claim 10, wherein the corrugating device comprises a  
first corrugating roll and a second corrugating roll.

16. The apparatus of claim 10, wherein the water supply device is a first  
water supply device, and wherein the apparatus further comprises a second water supply  
device, the second water supply device being adapted to apply water to the plurality of crests  
on the second side of the single-faced corrugated board.

17. The apparatus of claim 10, wherein the starch supply device is a first  
starch supply device, and wherein the apparatus further comprises a second starch supply  
device adapted to apply starch to the plurality of crests on the second side of the first web.

35. The apparatus of claim 10, wherein the water supply device comprises a sprayer.



I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as First Class Mail, in an envelope addressed to: MS AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

Dated: January 3, 2005

Signature:

(Thomas A. Miller)

EXPEDITED PROCEDURE  
REPLY UNDER 37 C.F.R 1.116  
GROUP ART UNIT 1733

Docket No.: 28748/37575  
(PATENT)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

**In re Patent Application of:**  
Stephen R. Schmidt

**Application No.:** 09/961,126

**Art Unit:** 1733

**Filed:** September 21, 2001

**Examiner:** Gladys Josefina Piazza  
Corcoran

**For:** APPARATUS AND METHOD FOR  
MANUFACTURING CORRUGATED  
BOARDS

**DECLARATION OF STEPHEN R. SCHMIDT UNDER 37 C.F.R. 1.131**

MS AF  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

I, Stephen R. Schmidt, declare as follows:

1. I am the sole inventor of the subject matter disclosed in the above-referenced patent application.
2. I have reviewed the final office action issued by the U.S. Patent and Trademark Office on September 3, 2004, as well as the prior art cited by the Examiner therein.
3. I am President of Copar Corporation, a leader in the corrugated paper technology, and assignee of many U.S. Patents, including U.S. Patent Nos. 5,676,790; 4,516,702; 4,389,971; 4,389,969; and 4,369,080.

4. I have been involved in the corrugated paper industry for over 35 years and have never seen a similar device as is pending in the above-referenced patent application.

5. In regard to the Swift patent, it mentions spraying an aqueous solution of sodium silicate to the formed medium web. The stated purpose of the spray is to reinforce the strength of the medium. The spray appears to be perpendicular to the single face web. Depending on the distance from the spray device in the medium, the spray would, I agree, tend to apply more spray to the flute tip than to the balance of the medium. However, I have tried to spray a silicate solution, as noted, in an actual paper mill and have found that spraying silicate is impractical. Due to the nature of the material, the spraying device is rapidly covered with a hard coating of a "water glass" which is extremely difficult to remove. Accordingly, silicate solutions are now normally roll coated with a rotary sponge, or other coating method, and before the medium is corrugated.

6. I have also seen wax (for water resistance) applied in the same way or cascaded on to the finished material in a direction parallel to the flutes.

7. The Wallick patents again refer to spraying a coating onto the formed medium web. This coating is also designed to increase the stacking strength of the paper by reinforcing the fiber. It is stated that the starch will cover the application flute tips to prevent the contamination of the liner with the sprayed material. From what I can see, the spray must, by nature, coat the entire surface of the medium, and as such, does not parallel the proposed disclosure. Again, this device is impractical because the spray would coat the corrugating rolls as well as the medium. The coating would thus prevent proper machine operation and damage the machine.

8. As a result of these teachings and others, it is clear that the modern corrugating industry is still in need of improvements. This is particularly so do to a number of current changes, not the least of which is that modern corrugators can and do run faster. That is to say, they have greater capacity to supply heat to cure

the applied adhesive in the shorter time required for high speed. In addition, there is an economic need to improve production.

9. Another difference is that modern corrugating rolls have to be made larger in diameter in order to provide sufficient strength at high speed. Steam temperature and flow rates have also increased. These factors combine to mean that the medium and applied starch are subjected to more heat during the corrugating process.

10. There is also an increasing demand for improved stacking strengths with reduced paper fiber content for reasons of economy and ecology. Paper mills have responded by utilizing a new high ring crush paper technology which produces a stronger and denser paper. Due to the relative absence of insulating voids, this denser paper also heats faster on the corrugators. This fast response to heating makes controlled heat and adhesive application more critical.

11. It is possible to adjust the heat applied to the paper prior to its entering the single facer by adding or removing contact with a heated drum. It is proven to be impossible to adjust the heat applied once the medium has reached the corrugating roll. Likewise, the heat applied at the entrance to the double backer is difficult to regulate.

12. Another complication is that machine operating crews have had difficulty in obtaining proper results using the high speed machines with the new dense papers.

13. As a consequence of all this, it is common practice to increase the amount of adhesive applied as the machine slows down. This extra adhesive tends to quench the heat applied, making the process more forgiving.

14. However, I have noticed that this extra adhesive is not required to provide a bond between the medium and the liner. It is clear that a proper bond is formed at higher speeds using less adhesive.

15. Moreover, extra adhesive results in quality problems as well as increased costs for the adhesive. For example, the liner paper is pulled in to conform with the flute tip as the extra adhesive cures. This results in a defect in the surface of the finished corrugated sheet known as "washboarding" due to its resemblance to the surface of an old style laundry device. Washboarding reduces board strength and also results in a surface which is difficult to print upon. Any attempt at printing using techniques to avoid crushing the board so that stacking strength is maintained results in a "barred" appearance. This printing defect is often commercially acceptable.

16. However, with the teaching afforded by my pending application, this washboarding can be avoided and in fact higher maximum speed machines can be designed, by a voiding this application of extra adhesive.

17. More specifically, the pending device reduces the requirement to add extra starch when running slower with dense papers. Instead of adding more of the standard slurry of starch and water, the new device adds only water first. The heat control offered by the added water then reduces or eliminates the need for additional starch.

18. In addition, the pending device allows the corrugating machines to reach higher speeds by "quenching" the extra heat incrementally when the machine speed is reduced.

19. To summarize, water is added to the flute tip prior to the application of the starch. The amount of water applied is reduced or eliminated as needed independently of the starch slurry application. This approach, to my knowledge, is entirely novel. It is the direct result of changes made in the corrugated industry in the last 10 to 15 years which I studied to arrive at the pending subject matter as set forth in the current claims. Moreover, none of the cited art even suggests this excessive heat is a problem, much less does it identify the solution I have conceived.

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20. In light of all the foregoing, I respectfully submit that the pending application includes novel and non-obvious subject matter.

Dated: November 30, 2004

By

DECLARED,

  
Stephen R. Schmidt



(19)

Europäisches Patentamt

European Patent Office

Office européen des brevets



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### (54) Apparatus and method for manufacturing corrugated boards

(57) Method and apparatus for manufacturing corrugated boards. The method include the steps of supplying a first web having a first and second sides, wherein in each side of the first web having a plurality of flutes, and wherein each flute having a crest, applying a wetting

agent and an adhesive composition in a sequential fashion to the plurality of flutes on the first side of the first web, and securing a second web to the plurality of crests on the first side of the first web to form a single-faced corrugated board.

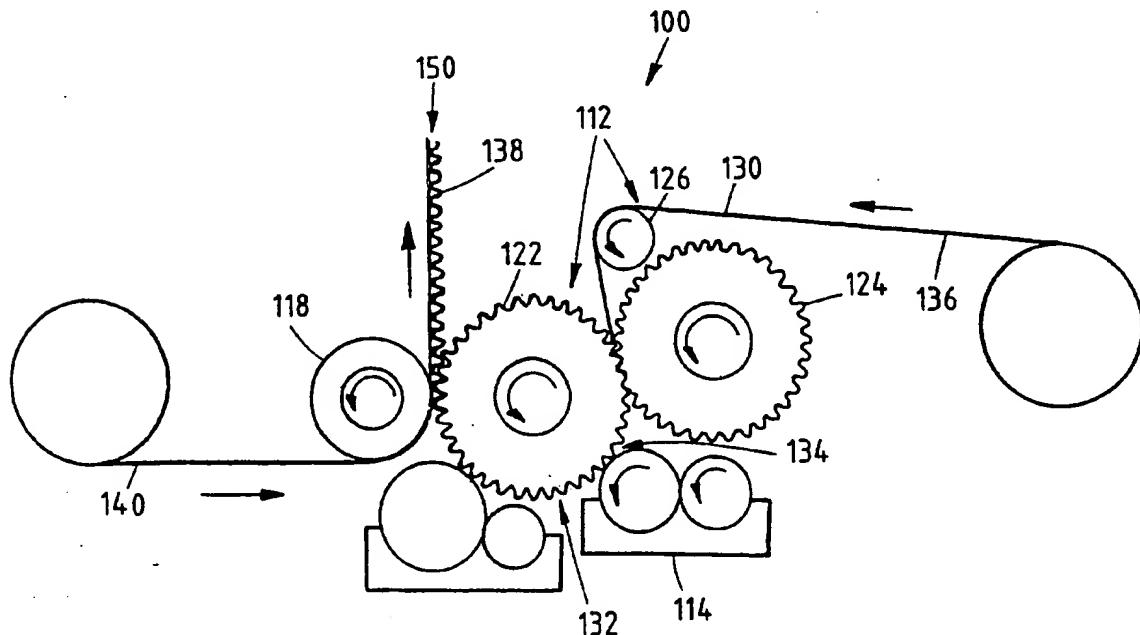


FIG. 1

**Description****FIELD OF INVENTION**

[0001] The invention generally relates to corrugated boards and, more particularly, relates to apparatus and method for manufacturing corrugated boards.

**BACKGROUND OF THE INVENTION**

[0002] Conventional corrugators produce single-faced, double-backed and multiple-wall corrugated boards by bonding papers together. Typically, an adhesive is applied to the surfaces of crests of the corrugated portion of the papers. In particular, a starch slurry is prepared as one of ordinary skill in the art will readily recognize using mainly powdered starch and water. Borax and caustic soda may also be added during the preparation of the starch slurry. The prepared starch slurry is often pumped into a reservoir or a pan and applied to flute tips (i.e., crests) of a web of fluting paper by an application roll. A turning doctor roll regulates the thickness of the starch slurry on the application roll to apply to the web of fluting paper, which is typically heated by a corrugating roll. A web of liner paper engages the web of fluting paper at the flute tips such that the starch slurry is absorbed into the web of liner paper as the fluting paper and the liner paper are firmly pressed together. The starch slurry is gelled by the application of heat from the corrugating roll and secures the flute tips onto the liner paper. In particular, during the cooking process, the granules of the powdered starch absorb water, burst, gelatinize and form a glue. The moisture in the glue then evaporates or is absorbed into the liner paper and the glue bonds the liner paper and the flute tips of the fluting paper together.

[0003] As one of ordinary skill in the art will readily recognize, the amount of the adhesive required to bond the liner paper with the flute tips of a fluting paper may vary based on the speed of the corrugating process. In particular, more adhesive is required in a corrugating process that operates at a lower speed. However, if the process is operating at a rate that is too slow, virtually all of the water from the starch slurry is absorbed after the slurry is applied to the flute tips and prior to the slurry becoming an adhesive. As a result, no bonds are formed between the liner paper and the flute tips of the fluting paper. Accordingly, more starch slurry is required in the process to simply serve as a carrier of water in order to ensure sufficient amount of water remains in the slurry to form the adhesive.

[0004] Further, the inventor has found that as the starch slurry is applied to a dry flute tip provided on a heated, fluted roller, the water of the slurry may be carried through the flute by capillary action at an undesirably fast pace and the starch may effectively dry on the flute. Typically, water from the starch slurry is absorbed into the fluting paper after the slurry is applied and be-

fore the slurry becomes an adhesive. Such a phenomenon has at least two negative implications. The first is that the percentage of unusable starch may be sufficient to degrade the effective adhesive quality of the slurry, thereby producing less than optimum product. The second is that manufacturers are required to compensate for this contingency by applying more starch to the flutes than would ordinarily be received to produce an effective bond, thereby reducing efficiency and increasing cost. It would therefore be advantageous to apply the starch slurry to the flute tips of the corrugated paper in a more efficient and effective manner. In particular, it would be advantageous to reduce the amount of starch slurry applied to the flute crests and accordingly reduce the cost of producing corrugated boards, while at the same time maintaining or improving bond quality.

**SUMMARY OF THE INVENTION**

[0005] In accordance with one aspect of the invention, a method for manufacturing corrugated boards is provided, which comprises the steps of supplying a first web of medium having a first and second sides with a plurality of flutes on each side and each flute having a crest,

supplying a second web of medium, applying a wetting agent to the crests on the first side of the first web, applying an adhesive composition to the crests on the first side of the first web, and securing the second web to the crests on the first side of the first web to form a single-faced corrugated board.

[0006] In accordance with another aspect of the invention, an apparatus for manufacturing corrugated boards is provided, which comprises a corrugating device, a wetting device, an adhesive supply device and a securing device.

The corrugating device is adapted to form a plurality of flutes on a first and second sides of a first web of medium. Each of the plurality of flutes includes a crest. The wetting device is adapted to apply a wetting agent to a plurality of crests on the first side of the first web. The adhesive supply device is adapted to apply an adhesive composition to the plurality of crests on the first side of the first web. The securing device is adapted to secure a second web of medium to the plurality of crests on the first side of the first web to form a single-faced corrugated board.

[0007] In accordance with another aspect of the invention, an apparatus for manufacturing corrugated boards is provided, which comprises first and second corrugated rolls rotationally engaged to each other, first and second wetting rolls disposed for rotation in a first reservoir, first and second adhesive rolls disposed for rotation in a second reservoir and a securing roll disposed to rotationally engage the first corrugated roll.

[0008] In accordance with another aspect of the invention, a corrugated article manufactured according to the steps comprising supplying a first web of medium having a first and second sides with a plurality of flutes on each side and each flute having a crest, supplying a

second web of medium, applying a wetting agent to a plurality of crests on the first side of the first web, applying an adhesive composition to the plurality of crests on the first side of the first web, and securing the second web to the plurality of crests on the first side of the first web to form a single-faced corrugated board.

[0009] These and other aspects and features of the invention will become apparent from the following detailed description when taken in conjunction with the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

FIG. 1 is a cross-sectional view of a single-faced corrugator constructed in accordance with teachings of the invention;

FIG. 2 is a cross-sectional view of a wetting device constructed in accordance with teachings of the invention;

FIG. 3 is a cross-sectional view of an alternate embodiment of the wetting device constructed in accordance with teachings of the invention;

FIG. 4 is a cross-sectional view of a double-backed corrugator constructed in accordance with teachings of the invention;

FIG. 5 is a flow chart depicting a sequence of steps used in conjunction with the method according to the teachings of the invention.

[0011] While the invention is susceptible to various modifications and alternative constructions, certain illustrative embodiments thereof have been shown in the drawings and will be described below in detail, it should be understood, however, that there is no intention to limit the invention to the specific forms disclosed, but on the contrary, the intention is to cover all modifications, alternative constructions and equivalents falling within the spirit and scope of the invention as defined by the appended claims.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] Referring now to the drawings, and with specific reference to FIG. 1, a corrugator constructed in accordance with the teachings of the invention is generally referred to by reference numeral 100. As shown therein, the corrugator 100 generally includes a corrugating device 112, a wetting device 114, an adhesive supply device 116, and a securing device 118. The corrugating device 112 includes a first component 122 and a second component 124, which may be, but are not limited to, corrugating rolls. In particular, each of the corrugating rolls includes a plurality of matting grooves with the depth, spacing, and shape of the grooves varying based on the intended purpose of the end product, i.e., the cor-

rugated board. A first web of medium 130 is supplied to the first and second components 122, 124 of the corrugating device 112 as one of ordinary skill in the art will readily recognize. For example, a support roll 126 may

5 used to support and supply the first web of medium 130 into the corrugating device 112. The first and second components 122, 124 are rotationally engaged such that a plurality of flutes 132 may be formed on a first web of medium 130. The plurality of flutes 132 may be a continuous series of generally sinusoidally shaped waves on the first web of medium 130, which may be, but is not limited to, fluting paper. Each of the plurality of flutes 132 on the first web of medium includes a crest (one generally shown as 134 in FIG. 1). The first component 122 10 of the corrugating device 112 may retain the first web of medium 130 by a mechanical device, a vacuum, or pressure applied to the first web of medium 130. In particular, the first web of medium 130 is disposed between the first component 122 of the corrugating device 112 and the wetting device 114 such that the wetting device 114 15 engages the crests of the plurality of flutes 132 on a first side 136 of the first web of medium 130.

[0013] Accordingly, the wetting device 114 does not engage a second side 138 of the first web of medium 130. In this part of the process, the wetting device 114 may be, but is not limited to, an anilox system (as shown in FIGS. 2 and 3, and further described in detail below) a system of rollers, a sprayer, a rod coater and a belt system. The wetting device 114 applies a wetting agent 20 to the crests of the plurality of flutes 132 on the first web of medium 130 to reduce the amount of adhesive composition needed to be applied to the crests.

[0014] As the first component 122 of the corrugating device 112 continues to retain the first web of medium 130, the adhesive supply device 116 applies an adhesive composition to the crests of the plurality of flutes 132 on the first web of medium 130. Similar to the wetting device 114, the adhesive supply device 116 also engages the crests of the plurality of flutes 132 on the first side 136 of the first web of medium 130. In particular, the adhesive supply device 116 may be, but is not limited to, an anilox system (as shown in FIGS. 2 and 3, and further described in detail below) a roller system and any other adhesive application system as known in the art.

[0015] Further, the securing device 118 is disposed to secure a second web of medium 140 to the crests of the plurality of flutes 132 on the first side 136 of the first web of medium 130 to form a single-faced corrugated board 150. The securing device 118 may be, but is not limited to, a heat application device such as a pressure roll and a belt, or simply paper tension.

[0016] It is to be understood that the above materials and dimensions are provided for the purpose of disclosing the currently known best mode for practicing the teachings of the invention, and should not be construed as limiting in any manner.

[0017] As noted above, the wetting device 114 may be, but is not limited to, an anilox system, a sprayer (i.

e., masked to spray at the crests only), a rod coater, and a belt system. For example, as shown in FIG. 2, the wetting device 114 may be an anilox system 200 that generally includes a storage device 210, a first roll 220 and a second roll 230. The storage device 210 may be, but is not limited to, a pan and a reservoir adapted to contain a wetting agent 240 such as water. The first and second rolls 220, 230 are rotationally engaged to apply the wetting agent 240 to the crests (e.g., crest 134) on the first side 136 of the first web 130. For example, both the first and second rolls 220, 230 rotate counter-clockwise to apply the wetting agent 240 to the crest 134. The second roll 230 is adapted to remove excess wetting agent 240 on the first roll 220. Further, the anilox system 200 may also be adapted to implement the adhesive supply device 116. For example, the first roll 220 may be adapted to apply an adhesive composition to the crest 134 and the second roll 230 may be adapted to remove excess amount of the adhesive composition on the first roll 220. The adhesive composition may be, but is not limited to, a starch composition and a water-based adhesive composition such as a poly vinyl acetate. For example, the starch composition may be a starch slurry produced from maize starch, wheat starch, potato starch, tapioca and other vegetable starch.

[0018] In an alternate embodiment, the wetting device 114 may be an anilox system 300 as shown in FIG. 3. The anilox system 300 generally includes a storage device 310, an applicator roll 320 and a doctor blade 330. The storage device 310 may be, but is not limited to, a pan and a reservoir adapted to contain a wetting agent 340 such as water. The applicator roll 320 provides water to the crests of the plurality of flutes 132 on the first web 130. The doctor blade 330 removes excess water from the applicator roll 320. Further, the adhesive supply device 116 may also be the anilox system 300 as described above. In yet another alternate embodiment, the wetting device 114 may be, but is not limited to, a sprayer with a moving aperture to limit spray to the flute tops only, a rod coater, and a belt system as one of ordinary skill in the art will readily recognize.

[0019] The wetting device 114 and the adhesive supply device 116 may also be used with a double-backer corrugator to form double-backed corrugated boards. Referring to FIG. 4, the double-backer corrugator 400 generally includes a wetting device 414, an adhesive supply device 416 and a securing device 418. The wetting device 414 and the adhesive supply device 416 may be, for example, the anilox systems as shown in FIGS. 2 and 3. The wetting device 414, for example, may apply a wetting agent 426 to the single-faced corrugated board 150. In particular, the wetting agent 426 is applied to the crests of the plurality of flutes 132 on the second side 138 of the first web 130 at a predetermined rate, which may be, but is not limited to, a constant rate and a variable rate. Further, the adhesive supply device 416 applies an adhesive composition 428 to the crests of the plurality of flutes 132 on the second side 138 of the first

web 130 after the wetting device 416 applied the wetting agent 426. A third web of medium 450, which may be, but is not limited to, liner paper, is supplied to the securing device 418. In particular, the third web of medium

5 450 is bonded to the single-faced corrugated board 150 at the crests of the plurality of flutes 132 on the second side 138 of the first web 130. Accordingly, the third web of medium 450 and the single-faced corrugated board 150 form a double-backed corrugated board 460. It is to be further understood that the teachings of the invention 10 can be employed in manufacturing multiple-wall corrugated boards having more than two single-faced corrugated boards and in manufacturing solid fiber boards without the plurality of flutes.

15 [0020] Referring now to FIG. 5, the flow chart thereof depicts a sequence of steps 500 which may be taken in accordance with the teachings of the invention to manufacture corrugated boards. As shown therein, a first step 510 thereof is supplying a first web of medium having a first and second sides. The first web of medium is prepared as one of ordinary skill in the art will readily recognize. A plurality of flutes are formed on the first web of medium such that each of the plurality of flutes includes a crest.

20 25 [0021] At a step 520, a wetting agent such as water with or without additives is applied to a plurality of crests on the first side of the first web. At a step 530, an adhesive composition such as a starch slurry is applied to the plurality of crests on the first side of the first web after the wetting agent is applied at step 520. The adhesive composition such as starch slurry is prepared as one of ordinary skill in the art will readily recognize. For example, the starch slurry may be heated to a temperature such that the powdered starch granules burst, gelatinize, and form a glue.

30 35 [0022] At a step 540, a second web of medium, which is also prepared as one of ordinary skill in the art will readily recognize, is secured to the plurality of crests on the first side of the first web using the adhesive composition. Accordingly, a single-faced corrugated board is formed by bonding the second web of medium and the plurality of crests on the first side of the first web of medium. A wetting agent may then be applied to the plurality of crests on the second side of the first web as indicated by a step 550.

40 45 [0023] At a step 560, an adhesive composition is applied to the crests on the second side of the first web after the wetting agent is applied at step 550. At a step 570, a third web of medium is secured to the crests on the second side of the first web using the adhesive composition. Accordingly, the third web of medium and the single-faced corrugated board are bonded to form a double-backed corrugated board.

50 55 [0024] Further, the sequence of steps as described above may be repeated to manufacture additional layers to the double-backed corrugated board. For example, a single-faced corrugated board is manufactured from step 510 through step 530 so that the single-faced

corrugated board may be secured to either the second or the third web of medium to form a multiple-wall corrugated board.

[0025] From the foregoing, one of ordinary skill in the art will appreciate that the invention provides a method for manufacturing corrugated board and an apparatus for accomplishing same.

6. The method of claim 1, wherein the step of applying an adhesive composition to the plurality of crests on the first side of the first web comprises applying the adhesive composition after applying the wetting agent to the plurality of crests on the first side of the first web, and wherein the starch composition comprises one of maize starch, wheat starch, potato starch, and tapioca.

### Claims

1. A method for manufacturing a corrugated board, comprising the steps of:

supplying a first web of medium having a first and second sides, each side of the first web having a plurality of flutes, and each flute having a crest;

supplying a second web of medium; applying a wetting agent to a plurality of crests on the first side of the first web;

applying an adhesive composition to the plurality of crests on the first side of the first web; and securing the second web to the plurality of crests on the first side of the first web to form a single-faced corrugated board.

2. The method of claim 1, wherein the step of applying a wetting agent to the plurality of crests on the first side of the first web comprises applying a water composition to the plurality of crests on the first side of the first web at a predetermined rate, and wherein the predetermined rate comprises one of a constant rate and a variable rate.

3. The method of claim 1, wherein the step of applying a wetting agent to the plurality of crests on the first side of the first web comprises applying a wetting agent to the plurality of crests on the first side of the first web prior to applying an adhesive composition to the plurality of crests on the first side of the first web.

4. The method of claim 1, wherein the step of applying a wetting agent to the crests on the first side of the first web comprises using a first water supply device to apply a water composition to the crests on the first side of the first web, and wherein the first water supply device comprises one of an anilox system, a sprayer, a plurality of rollers, a rod coater, and a belt system.

5. The method of claim 1, wherein the step of applying an adhesive composition to the plurality of crests on the first side of the first web comprises applying one of a starch composition and a water-based adhesive composition to the plurality of crests on the first side of the first web.

10 7. The method of claim 1 further comprising the steps of:

supplying the single-faced corrugated board; supplying a third web of medium; applying the wetting agent to the plurality of crests on the second side of the first web of the single-faced corrugated board; applying the adhesive composition to the plurality of crests on the second side of the first web of the single-faced corrugated board; and securing the third web to the plurality of crests on the second side of the first web of the single-faced corrugated board to form a double-backed corrugated board.

8. The method of claim 7, wherein the step of applying a wetting agent to the plurality of crests on the second side of the first web of the single-faced corrugated board comprises applying a water composition to the plurality of crests on the second side of the first web of the single-faced corrugated board prior to applying the adhesive composition to the plurality of crests on the second side of the first web of the single-faced corrugated board.

9. The method of claim 7, wherein the step of applying a wetting agent to the plurality of crests on the second side of the first web of the single-faced corrugated board comprises using a second water supply device to apply a water composition to the plurality of crests on the second side of the first web of the single-faced corrugated board, and wherein the second wetting device comprises one of an anilox system, a sprayer, a plurality of rollers, a rod coater, and a belt system.

10. An apparatus for manufacturing a corrugated product comprising:

a corrugating device adapted to form a plurality of flutes on a first and second sides of a first web of medium, each flute having a crest; a wetting device adapted to apply a wetting agent to a plurality of crests on the first side of the first web; an adhesive supply device adapted to apply an adhesive composition to the plurality of crests on the first side of the first web; and

— a securing device adapted to secure a second web of medium to the plurality of crests on the first side of the first web to form a single-faced corrugated board.

11. The apparatus of claim 10, wherein the corrugating device comprises a first corrugating roll and a second corrugating roll.

12. The apparatus of claim 10, wherein the wetting device comprises one of an anilox system, a sprayer, a plurality of rollers, a rod coater, and a belt system.

13. The apparatus of claim 12, wherein the anilox system comprises a applicator roll, a doctor blade and a storage device, and wherein the storage device is adapted to contain the wetting agent.

14. The apparatus of claim 12, wherein the anilox system comprises a first roll, a second roll, and a storage device, and wherein the storage device is adapted to contain the wetting agent.

15. The apparatus of claim 10, wherein the wetting device is adapted to apply a wetting agent to the plurality of crests on the first side of the first web prior to the adhesive supply device applying an adhesive composition to the plurality of crests on the first side of the first web.

16. The apparatus of claim 10, wherein the wetting device is a first wetting agent supply device, and wherein the apparatus further comprises a second wetting agent supply device, the second wetting agent supply device being adapted to apply a wetting agent to the plurality of crests on the second side of the single-faced corrugated board.

17. The apparatus of claim 16, wherein the adhesive supply device is a first adhesive supply device, and wherein the apparatus further comprises a second adhesive supply device adapted to apply an adhesive composition to the plurality of crests on second side of the first web.

18. An apparatus for manufacturing corrugated boards comprising:

first and second corrugated rolls rotationally engaged with each other; 50  
first and second wetting rolls disposed for rotation in a first reservoir; first and second adhesive rolls disposed for rotation in a second reservoir; and a securing roll disposed to rotationally engage the first corrugated roll.

19. The apparatus of claim 18, wherein the first and

— second wetting rolls are positioned such that the wetting rolls engage a web of medium prior to the first and second adhesive rolls.

5 20. A corrugated article manufactured according to the steps comprising:

supplying a first web of medium having a first and second sides, each side of the first web having a plurality of flutes, and each flute having a crest; supplying a second web of medium; applying a wetting agent to a plurality of crests on the first side of the first web; applying an adhesive composition to the plurality of crests on the first side of the first web; and securing the second web to the plurality of crests on the first side of the first web to form a single-faced corrugated board.

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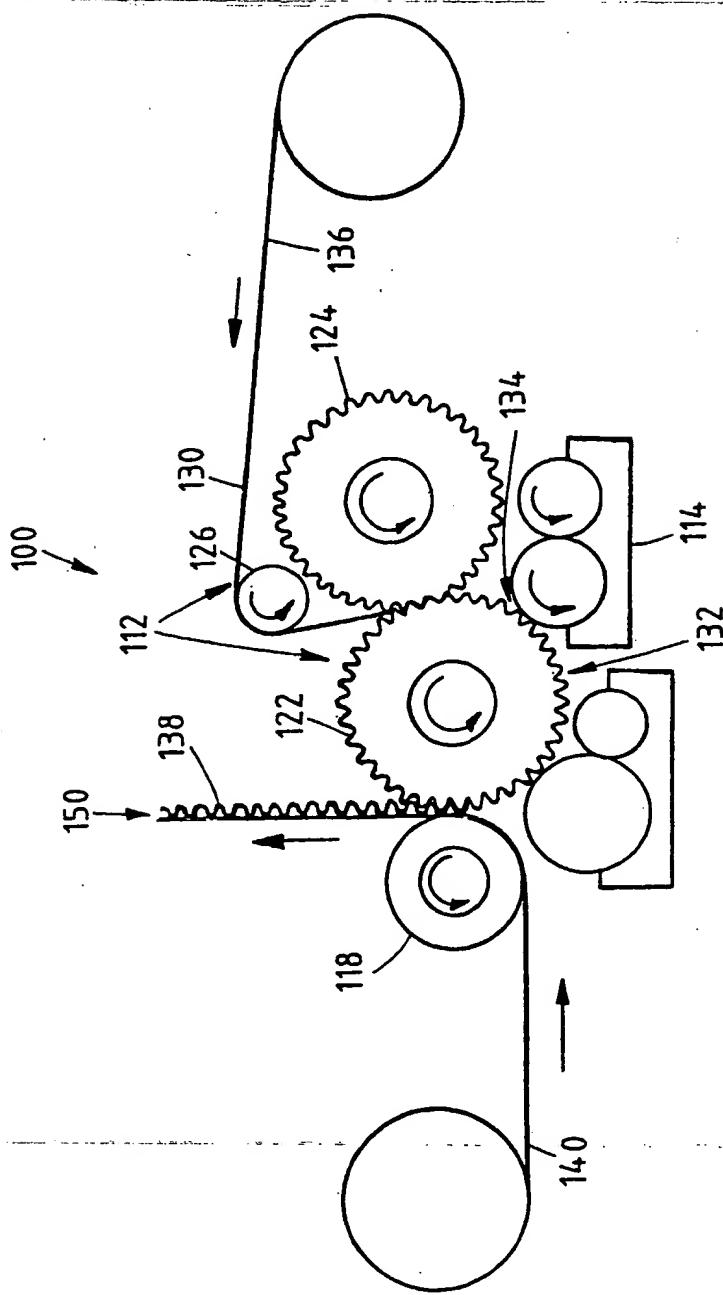


FIG. 1

FIG. 2

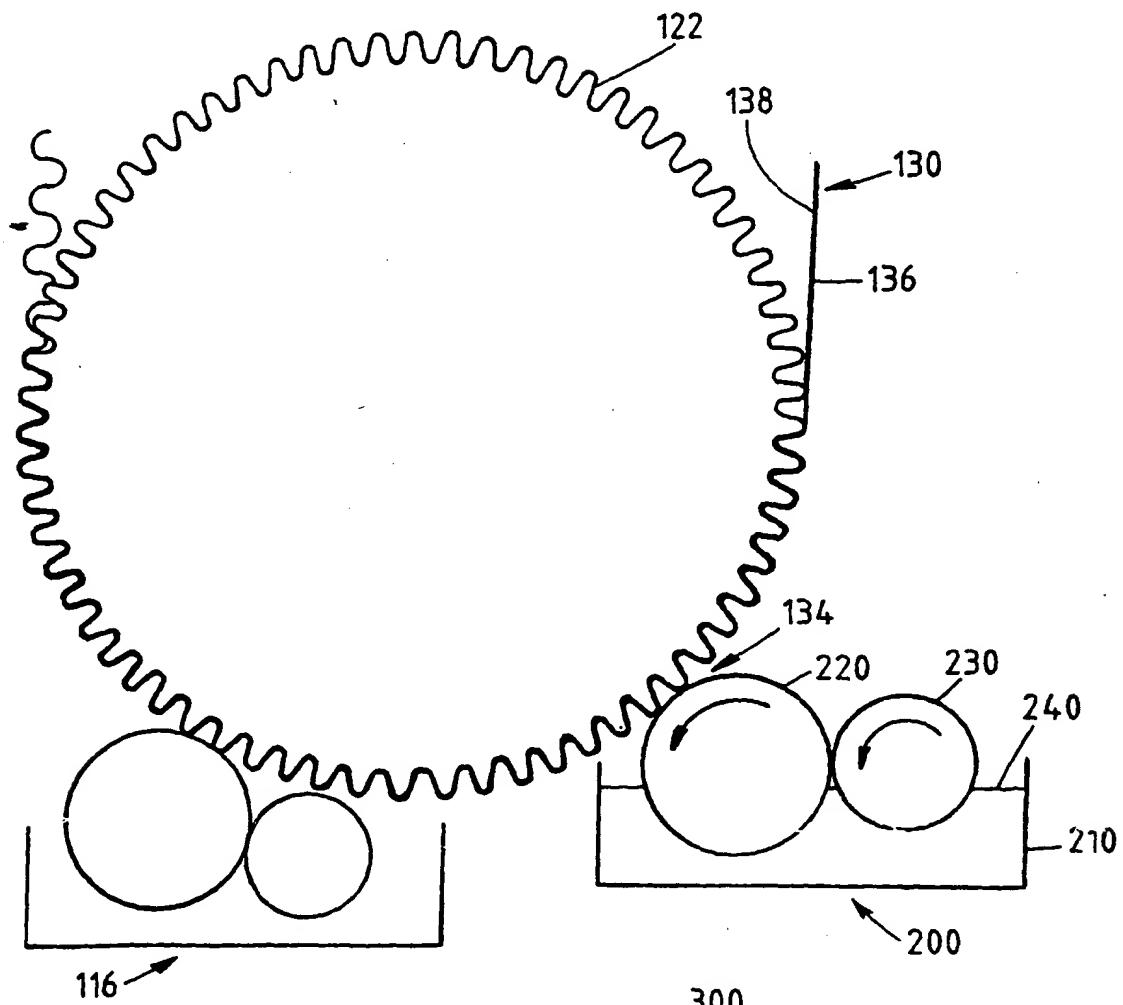
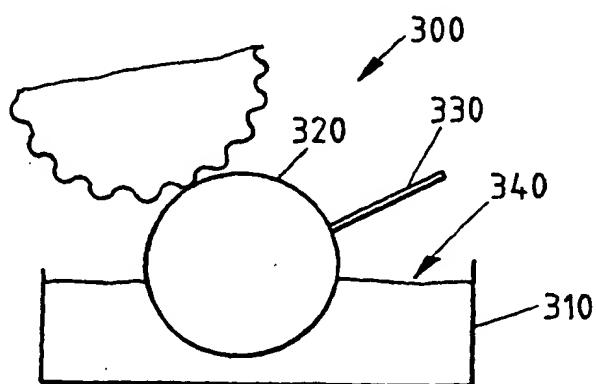


FIG. 3



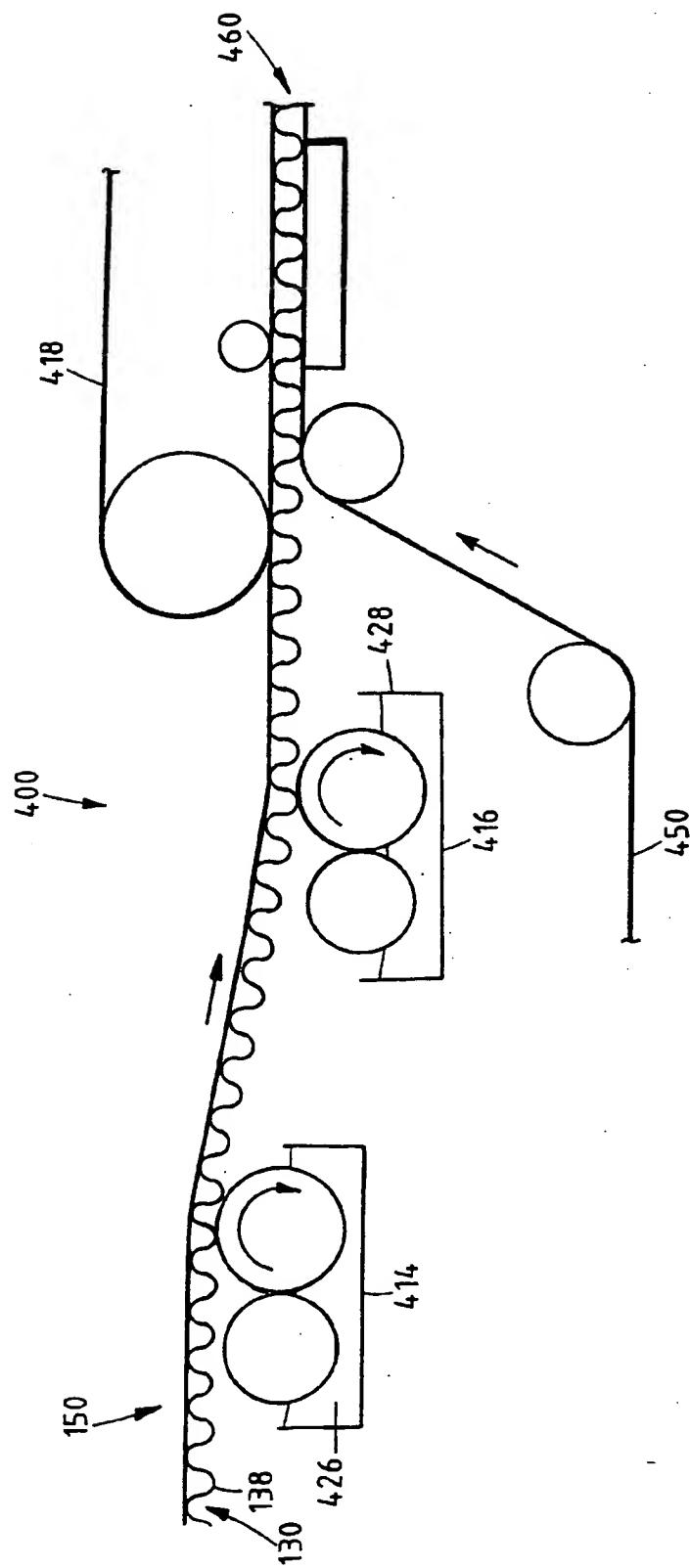


FIG. 4

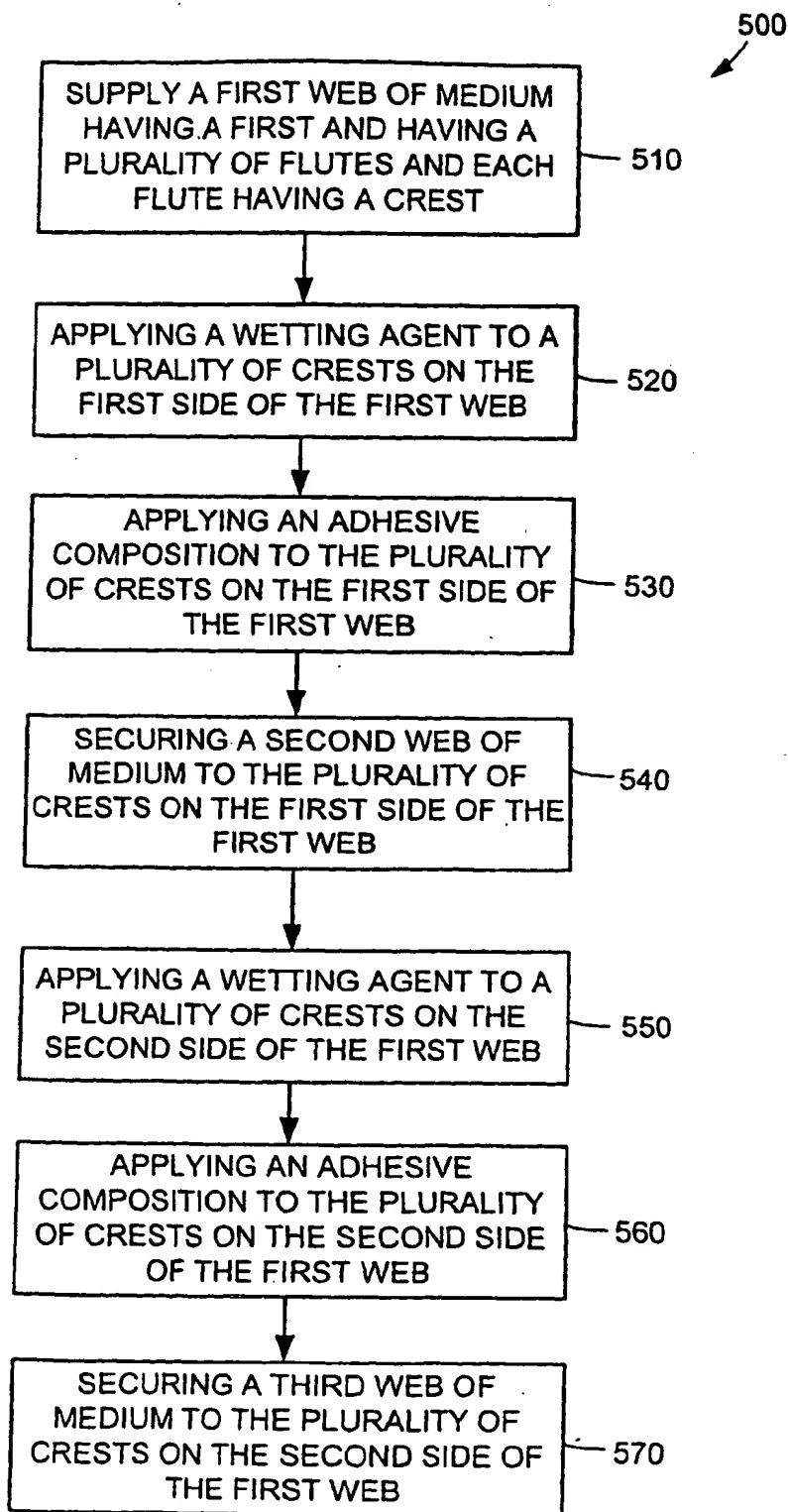


FIG. 5



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## EUROPEAN SEARCH REPORT

Application Number

EP 02 29 2033

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 3 922 129 A (MCDONALD WILLIAM V) 25 November 1975 (1975-11-25) * abstract; claims; figures *	1-20	B31F1/28
A	EP 0 951 998 A (UMETANI MFG CO LTD) 27 October 1999 (1999-10-27) * abstract; figure 1 *	4,13,14	
A	WO 97 15440 A (INT PAPER CO) 1 May 1997 (1997-05-01)		
A	EP 0 936 059 A (MITSUBISHI HEAVY IND LTD) 18 August 1999 (1999-08-18)		
The present search report has been drawn up for all claims			
Place of search  THE HAGUE	Date of completion of the search  15 November 2002	Examiner  J-E. Söderberg	
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DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 3 922 129 A (MCDONALD WILLIAM V) 25 November 1975 (1975-11-25) * abstract; claims; figures *	1-20	B31F1/28
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A	WO 97 15440 A (INT PAPER CO) 1 May 1997 (1997-05-01)		
A	EP 0 936 059 A (MITSUBISHI HEAVY IND LTD) 18 August 1999 (1999-08-18)		

TECHNICAL FIELDS  
SEARCHED (Int.Cl.7)

B31F

The present search report has been drawn up for all claims

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Place of search

Date of completion of the search

Examiner

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15 November 2002

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*90494452 1de*

Application No. 02 292 033.4 - 2308	Ref. BEP020207/CV	Date 26.01.2005
Applicant Copar Corporation		

**Communication pursuant to Article 96(2) EPC**

The examination of the above-identified application has revealed that it does not meet the requirements of the European Patent Convention for the reasons enclosed herewith. If the deficiencies indicated are not rectified the application may be refused pursuant to Article 97(1) EPC.

You are invited to file your observations and insofar as the deficiencies are such as to be rectifiable, to correct the indicated deficiencies within a period

of 4 months **DOCKETED: (5/26/05)**

from the notification of this communication, this period being computed in accordance with Rules 78(2) and 83(2) and (4) EPC.

One set of amendments to the description, claims and drawings is to be filed within the said period on separate sheets (Rule 36(1) EPC).

**Failure to comply with this invitation in due time will result in the application being deemed to be withdrawn (Article 96(3) EPC).**



Janc, G  
 Primary Examiner  
 for the Examining Division

Enclosure(s): 1 page/s reasons (Form 2906)



Bescheid/Protokoll (Anlage)		Communication/Minutes (Annex)		Notification/Procès-verbal (Annexe)	
Datum Date Date	26.01.2005	Blatt Sheet Feuille	1	Anmelde-Nr.: Application No.: 02 292 033.4 Demande n°:	

The examination is being carried out on the **following application documents**:

**Description, Pages**

1-11 as originally filed

**Claims, Numbers**

1-20 as originally filed

**Drawings, Sheets**

1-4 as originally filed

To make the papers ready for grant you are invited to redraft the claims in line with Rules 29.1 and 29.7 - two part form and reference numerals. Claim 20 appears to be unnecessary with regard to Article 64.2 EPC.

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